ABSTRACT

A GaN based enhancement mode MOSFET includes a GaN layer and a (Group III)$_x$Ga$_{1-x}$N layer, such as an Al $_x$Ga$_{1-x}$N disposed on the GaN layer. The thickness of the Al$_x$Ga$_{1-x}$N layer is less than 20 nm to provide a negligible sheet carrier concentration in the GaN layer along its interface with Al$_x$Ga$_{1-x}$N. A source and a drain region extend through the Al$_x$Ga$_{1-x}$N layer into the GaN layer, the source and drain region separated by a channel region. A gate dielectric is disposed over the channel region. A gate electrode is disposed on the gate dielectric. The MOSFET formed is a true enhancement MOSFET which is in an off state when the gate is unbiased.